CLAIMS

1. A radio-frequency imaging system for noninvasively imaging the internal structure of an object, comprising:

means for generating a beam comprised of radio frequency signals, said signals having a particular wavelength, that is to be passed through said object;

means for transmitting said beam toward said object;

means for receiving said beam after said beam has passed through said object;

scanning means for providing images of said object's internal structure;

means for generating said images of said object's internal structure; and

means for displaying said images of said object's internal structure.

2. The radio-frequency imaging system of claim 1 wherein said radio frequency signals are comprised of a single frequency.

3. The radio-frequency imaging system of claim 1 wherein said radio frequency signals are comprised of multiple frequencies.

4. The radio-frequency imaging system of claim 1 further comprising means for generating additional beams and means for transmitting additional beams, said means for transmitting said additional beams situated proximate said object in order to obtain localized RF energy cross-beam information.

5. The radio-frequency imaging system of claim 4 wherein said additional beams are comprised of radio frequency signals, each of a different frequency.

6. The radio-frequency imaging system of claim 1 wherein said scanning means is physically connected to said beam transmitting means and said beam receiving means and moves one or both in a linear orientation proximate said object in order to measure said beam's attenuation and to create an X-Y planar scan of said object representing a spatial position of said beam through said object.

7. The radio-frequency imaging system of claim 1 wherein said scanning means is physically connected to said beam transmitting means and beam receiving means and moves one or both in a rotational orientation about said object, and moves one or both along said object, in order to measure said beam's attenuation as a function of axial position and azimuth angle and to create a three-dimensional cylindrical tomographical

scan of said object representing attenuation of the beam as a function of a spatial position of said beam through said object.

8. The radio-frequency imaging system of claim 1 wherein said signal transmitting means is a parabolic reflector antenna.

9. The radio-frequency imaging system of claim 1 wherein said signal transmitting means is a cassegrain antenna.

10. The radio-frequency imaging system of claim 1 wherein said signal transmitting means is a horn antenna.

11. The radio-frequency imaging system of claim 1 wherein said signal transmitting means is a waveguide having a small aperture.

12. The radio-frequency imaging system of claim 1 wherein said beam has a width greater than the wavelength of said radio frequency signals.

13. The radio-frequency imaging system of claim 1 wherein said signal beam is comprised of spherical wavefronts.

14. The radio-frequency imaging system of claim 1 wherein said beam receiving means are situated within said beam's path, said beam receiving means for measuring a ratio of received signal power to transmitted signal power.

15. The radio-frequency imaging system of claim 5 wherein said beam receiving means are situated within said beam's path, said beam receiving means for measuring a ratio of received signal power to transmitted signal power.

16. The radio-frequency imaging system of claim 1 further comprising one or more auxiliary detectors coupled to said beam transmitting means and said beam receiving means, said auxiliary detectors situated at predetermined angles in relation to the path of said beam in order to gather additional information regarding RF energy scattered out of said beam.

17. The radio-frequency imaging system of claim 5 further comprising one or more auxiliary detectors coupled to said beam transmitting means and said beam receiving means, said auxiliary detectors situated at predetermined angles in relation to the path of said beams in order to gather additional information about RF energy scattered out of said beams.

18. The radio-frequency imaging system of claim 17 wherein said one or more auxiliary detectors are sensitive to a frequency caused by interaction of said beams with the internal structure or organs of said object.

19. The radio-frequency imaging system of claim 18 wherein said object is a live human or animal and said interaction of said beams produces a therapeutic effect.

20. The radio-frequency imaging system of claim 14 wherein said beam receiving means further comprises an effective detector aperture less than or equal to one wavelength of the transmitted and received radio frequency signals.

21. A security imaging system for noninvasively scanning people or objects comprising:

means for generating a beam comprised of radio frequency signals, said signals having a particular wavelength, that is to be passed through said person or said object;

means for transmitting said beam toward said person or said object;

means for receiving said beam after said beam has passed through said person or said object;

scanning means for providing images of said person or said object's internal structure;

means for generating said images of said person or said object's internal structure; and

means for displaying said images of said person or said object's internal structure.

22. A method of noninvasively imaging the internal structure of an object, person or animal, said method comprising the steps of:

generating a beam comprised of radio frequency signals that is to be passed through said object;

transmitting said beam toward said object;

receiving said beam after said beam has passed through said object;

scanning said beam for providing images of said object's internal structure;

generating said images of said object's internal structure; and

displaying said images of said object's internal structure.

23. The method of claim 22 wherein said radio frequency signals are comprised of a single frequency.

24. The method of claim 22 wherein said radio frequency signals are comprised of multiple frequencies.

25. The method of claim 22 further comprising the steps of generating additional beams and transmitting said additional beams, said step of transmitting said additional beams to obtain localized RF energy cross-beam information.

26. The method of claim 25 wherein said additional beams are comprised of radio frequency signals, each of a different frequency.

27. The method of claim 22 wherein said step of scanning said beam further comprises the steps of measuring said beam's attenuation and creating an X-Y planar or planar tomographic scan of said object representing a spatial position of said beam through said object.

28. The method of claim 22 wherein said step of scanning said beam further comprises the steps of measuring said beam's attenuation to create an attenuation map, creating a three-dimensional cylindrical tomographical scan of said object representing a spatial position of said beam through said object, and processing the attenuation map to yield an image of internal organs or structures of the object.

29. The method of claim 22 further comprising the step of measuring a ratio of received signal power to transmitted signal power, said step of measuring performed by said beam receiving means situated within the path of said beam.

30. The method of claim 26 further comprising the step of measuring a ratio of received signal power to transmitted signal power, said step of measuring performed by said beam receiving means situated within the path of said beam.

31. The method of claim 22 further comprising the step of gathering additional information regarding RF energy scattered out of said beam via one or more auxiliary detectors situated at predetermined angles in relation to the path of said beam.

32. The method of claim 26 further comprising the step of gathering additional information about RF energy scattered out of said beams via one or more auxiliary detectors situated at predetermined angles in relation to the path of said beams.

33. The method of claim 32 wherein said one or more auxiliary detectors are sensitive to a frequency caused by interaction of said beams with the internal structure or organs of said object.

34. The method of claim 33 wherein said object is a live human or animal and said interaction of said beams produces a therapeutic effect.

35. The method of claim 29 further comprising the step of providing a detector with an effective aperture less than or equal to one wavelength of the transmitted and received radio frequency signals.

36. A system for noninvasively affecting, processing or interacting with internal structures, subsystems and/or components of an industrial object or system comprising:

means for transmitting one or more scanned beams of radio frequency energy wherein each said beam has a different frequency, through the object or the system such that the radio frequency energies are delivered to a volume of intersection of said beams, and wherein combinations of said frequencies interact specifically with said internal structures, said subsystems and/or said components to create a desired effect.

37. The imaging system of claim 1 further comprising computer means for comparing said generated images of said object with actual images of said object, said actual images of said object stored in a computer storage medium, said means for

comparing to determine if said object is missing components, and if said object is a human or animal, to determine if said object is missing an internal organ or has broken or damaged an internal organ, said computer means capable of correcting said generated image to more closely match said stored actual image.

38. The method of claim 22 further comprising the step of comparing said generated images of said object with actual images of said object, said actual images of said object stored in a computer storage medium, said step of comparing to determine if said object is missing components, and if said object is a human or animal, determining if said object is missing an internal organ or has broken an internal organ, said computer means capable of correcting said generated image to more closely match said stored actual image.

39. The imaging system of claim 37 further comprising software instructions stored in said computer storage medium, said software instructions to compensate for diffraction effects from the object.